Claims:

1. A method of manufacturing an electronic component comprising at least one n- or p- doped portion, comprising the steps of:

co-depositing inorganic semi-conducting nanoparticles and dopant on a substrate, the nanoparticles comprising a group four element such as silicon or germanium;

fusing the nanoparticles by heating to form a continuous layer; and subsequently;

recrystallising the layer.

2. The method of claim 1, wherein the recrystallising step generates a continuous polycrystalline layer of doped semi-conducting material.

3. The method of claim 1 or claim 2, wherein the nanoparticles have an average diameter in the range of 3-120 nanometres.

4. The method of any one of claims 1 to 3, wherein the step of fusing and/or recrystallising is carried out in a reducing atmosphere.

5. The method of claim 4, wherein the reducing atmosphere comprises approximately 2% hydrogen.

6. The method of claim 4 or claim 5, wherein the reducing atmosphere comprises an inert gas, such as argon.

7. The method of any one of claims 1 to 6, wherein the step of fusing is carried out using one or more first laser pulses.

8. The method of any one of claims 1 to 7, wherein the step of recrystallising is carried out using one or more second laser pulses, subsequent to the first laser pulses.

9. The method of any one of claims 1 to 6, wherein the fusing step and/or the recrystallising step is carried out in an oven or the like.

10. The method of claim 9, wherein in the recrystallising step, the fused nanoparticles are cooled under predetermined conditions to cause recrystalisation.

11. The method of any one of claims 1 to 10, wherein the nanoparticles are deposited in a suspension of a carrier fluid.

12. The method of claim 11, wherein the carrier fluid comprises a dispersion agent, which stabilises the nanoparticles in suspension.

13. The method of claim 12, wherein the dispersion agent is a non-ionic surfactant such as polyethylene glycol (MW 200).

14. The method of any one of claims 11 to 13, wherein the nanoparticles are deposited in an inkjet printing process, or a digital offset printing process, or other digital printing process.

15. The method of any one of claims 11 to 14, wherein at least one dimension of the area on the substrate to be occupied by the nanoparticles is selected using a prior step of printing.

16. The method of claims 15, wherein the printing step is a soft contact lithographic printing process.

17. The method of claim 15 or claim 16, wherein the printing process is arranged to deposit a material on the substrate, which limits the position of the carrier fluid when deposited on the substrate through hydrophilic/hydrophobic interaction.

18. The method of claims 17, wherein the material is paraffin wax dissolved in toluene or a similar hydrophobic material.

19. The method of any one of claims 1 to 18, wherein the recrystallised continuous structure forms the source, or drain, or gate region of a transistor, or a component of a p-n, n-p, p-n-p, or n-p-n junction.

20. The method of any one of claims 1 to 19, wherein the electronic component is a transistor, or capacitor, or a diode.

21. A method of manufacturing a recrystallised structure composed of a group four element such as silicon or germanium, comprising the steps of;

depositing inorganic nanoparticles of the group four element on a substrate;

melting the nanoparticles by heating to form an amorphous structure; and subsequently,

recrystallising the amorphous structure.

22. A method of manufacturing an electronic component comprising at least one n- or p- doped portion, comprising the steps of:

co-depositing discrete nanoparticles of semi-conducting material with a dopant on a substrate;

fusing the nanoparticles with one or more first laser pulses to form an continuous structure; and subsequently,

recrystallising the continuous structure with one or more second laser pulses.

23. The method of claim 22, wherein the nanoparticles are substantially inorganic materials.

24. The method of claim 22 or claim 23, wherein the nanoparticles are of a group four elements, such as silicon or germanium.

25. The method of any one of claims 22 to 24, wherein the nanoparticles have an average diameter in the range of 3-120 nanometres.

26. The method of any one of claims 22 to 25, wherein the duration of melting of the particles during the fusing step is longer than the duration of melting of the continuous structure during the recrystallisation step.

27. The method of any one of claims 22 to 26, wherein the step of fusing or recrystallising is carried out in a reducing atmosphere.

28. The method of claim 27, wherein the reducing atmosphere comprises approximately 2% hydrogen.

29. The method of claim 28, wherein the reducing atmosphere comprises an inert gas, such as argon.

30. The method of any one of claims 22 to 29, wherein the electronic component is a transistor, a capacitor, or a diode.

31. An ink suitable for inkjet printing comprising a suspension of inorganic nanoparticles suspended in carrier fluid, the nanoparticles comprising a group four element such as silicon or germanium.

32. An ink according to claim 31, wherein the nanoparticles have an average diameter in the range of 3-120 nanometres.

33. An ink according to claim 31 or 32, wherein the ink further comprises an n-type dopant such as an arsenic compound or a p-type dopant such as a boron compound.

34. An ink according to any one of claims 31 to 33, further comprising a dispersion agent, adapted to stabilise the nanoparticles in suspension in the carrier fluid.

35. An ink according to claim 34, wherein the dispersion agent is a non-ionic surfactant such as polyethylene glycol (MW 200).

36. An ink according to any one of claims 31 to 35, further comprising a binder material adapted to reduce the migration of the nanoparticles during drying on a non-adsorbent surface.

37. An ink according to claim 36, wherein the binder material is an organic binder, such as polyvinyl alcohol, or hydroxypropylcellulose, or a UV curable monomer such as poly methylmethacrylate.

38. An ink according to any one of claims 31 to 37, further comprising a humectant such as 2-pyrollidinone or 1-3 propanediol.

39. An ink according to any one of claims 31 to 38, wherein the suspension is aqueous.

40. An ink according to any one of claims 31 to 38, wherein the suspension is non-aqueous.

41. A method of forming an inorganic dielectric on a substrate comprising the steps of:

inkjet printing on a substrate a carrier fluid carrying nanoparticles of an inorganic insulator material;

evaporating the carrier fluid so as to leave a powder of nanoparticles;

at least partially melting the nanoparticles to generate a substantially continuous film of inorganic dielectric material.

42. A method according to claim 41, wherein the nanoparticles are a metal oxide, such as Al_2O_3, $Ti0_2$, or ZrO_2.

43. A method according to claim 41, wherein the wherein the nanoparticles are glass particles.

44. A method according to any one of claims 41 to 43, wherein either or both of the steps of evaporating and melting are carried out using a laser process.

45. A method according to any one of claims 41 to 43, wherein either or both of the steps of evaporating and melting are carried out using an oven or the like.

46. A method according to any one of claims 41 to 45, wherein at least one dimension of the area on the substrate to be occupied by the nanoparticles is selected using a prior printing step.

47. A method according to claim 46, wherein the printing step is a soft contact lithographic printing step.

48. The method of claim 46 or claim 47, wherein the printing step is arranged to deposit a material on the substrate, which limits the position of the carrier fluid when deposited on the substrate through hydrophilic/hydrophobic interaction.

49. A method according to any one of claims 41 to 43, wherein the substantially continuous inorganic film forms part of an electrical component; such as a capacitor or a gate oxide in a metal oxide silicon transistor.

50. An ink suitable for inkjet printing comprising a suspension of nanoparticles suspended in a carrier fluid, the nanoparticles comprising an inorganic dielectric material.

51. An ink according to claim 50, wherein the nanoparticles are a metal oxide, such as SiO_2, Al_2O_3, $Ti0_2$, or ZrO_2.

52. An ink according to claim 50, wherein the nanoparticles are a glass material.

53. An ink according to any one of claims 50 to 52, wherein the nanoparticles are have a diameter of approximately 3-120 nanometres.

54. An ink according to any one of claims 50 to 53, wherein the nanoparticles are suspended in an aqueous suspension.

55. An ink according to any one of claims 50 to 54, further comprising a dispersion agent, adapted to stabilise the nanoparticles in suspension in the carrier fluid.

56. An ink according to claim 55, wherein the dispersion agent is a non-ionic surfactant such as polyethylene glycol (MW 200).

57. An ink according to any one of claims 50 to 56, further comprising a binder material adapted to reduce the migration of the nanoparticles during drying on a non-adsorbent surface.

58. An ink according to claim 57, wherein the binder material is an organic binder, such as polyvinyl alcohol, and hydroxypropylcellulose, or a UV curable monomer such as poly methylmethacrylate.

59. An ink according to any one of claims 50 to 58, further comprising a humectant such as 2-pyrollidinone or 1-3 propanediol.

60. An ink according to any one of claims 50 to 59, wherein the particles have a broad size distribution to achieve a high packing density.

61. A method of manufacturing a compound film of semiconducting material comprising the steps of:

depositing nanoparticles on a substrate;

causing the nanoparticles to fuse and recrystallise to form a recrystallised compound film.

62. A method according to claim 61, wherein the deposited nanoparticles comprise first nanoparticles of a first material and second nanoparticles of a second material.

63. A method according to claim 61, wherein the deposited nanoparticles comprise nanoparticles formed of both a first semiconducting material and a second semiconducting material.

64. A method according to claim 63, wherein substantially a ll of the deposited nanoparticles comprise both the first and the second semiconducting material.

65. A method according to any one of claims 62 to 64, wherein at least one of the semiconducting material is a group 4 element.

66. A method according to claim 65, wherein at least each of the first and second materials is a group 4 element.

67. A method according to claim 66, the first and second materials are silicon and germanium.

68. A method according to claim 61, wherein the deposited nanoparticles are of a first material and the substrate comprises a recrystallised film of a second material.

69. A method according to claim 68, wherein one or both of the first and second materials are a group four element.

70. A method according to claim 69, wherein the first material and the second material are silicon and germanium respectively, or germanium and silicon respectively.

71. A method according to any one of claims 68, 69, or 70, wherein the substrate is formed in a previous step, comprising the sub-steps:

depositing nanoparticles on a further substrate;

causing the nanoparticles to fuse and recrystallise to form a recrystallised film or layer.

72. A method according to any one of claims 61 to 71, wherein an inkjet printing process is used to depositing nanoparticles in at least one step of nanoparticle depositiion.

73. A method according to any one of claims 61 to 72, wherein at least one fusing step and/or at least one recrystsaliisation step is a laser treatment process.

74. An electronic component, or a component thereof manufactured using the method of any one of claims 61 to 73.

75. A hetrojunction bipolar transistors according to claim 74.

76. A transistor comprising an inkjet deposited gate portion.

77. A transistor according to claim 76, wherein the gate portion comprises a substantially inorganic material.

78. A transistor according to claim 77, wherein the gate portion comprises a metal oxide, such as Al_2O_3, $Ti0_2$, or ZrO_2 or a glass material.

79. A transistor according to claim 77, wherein the gate portion is formed from fused nanoparticles.

80. A transistor comprising an inkjet deposited n- or p- doped portion, the portion comprising substantially inorganic material.

81. A transistor according to claim 80, wherein the portion is formed from a group four element such as silicon or germanium.

82. A transistor according to claim 80 or claim 81, wherein the portion is formed from fused nanoparticles.

83. A transistor according to any one of claims 80 to 82, wherein the portion comprises a recryatallised layer or film.

84. A method of manufacturing an electronic component having an electrical characteristic dependent upon its geometry, comprising the step of defining at least one aspect of the geometry of the component using a contact lithographic printing process.

85. A method according to claim 84, the contact lithographic printing process printing a first material in a predetermined pattern onto a substrate, the method comprising the further step of depositing a second material onto the substrate, the second material forming a structure of the component and having a geometry that conforms to the pattern by virtue of hydrophilic-hydrophobic interaction.

86. A computer program or a computer program product comprising program code for performing the method steps of any one of claims 1 to 30, 41 to 49, 61 to 73, 84, or 85 when said program is run on a processing device associated with a suitable hardware.

87. An electronic component or circuit produced according to the method of any one of claims by any one of claims 1 to 30, 41 to 49, 61 to 73, 84, or 85.

88. An apparatus arranged to fabricate an electronic component on a substrate, the apparatus comprising a lithographic stamp arranged to transfer a predetermined pattern of hydrophobic material to the substrate, the apparatus further arranged to deposit a hydrophilic liquid adjacent or onto the pattern such that the liquid forms a structure having a geometry conforming to the pattern, the component having an electrical characteristic dependent upon the geometry of the structure.